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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,859	12/28/2001	Alan Gatherer	TI-32753	7120

23494 7590 04/29/2005

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EXAMINER

ABRAHAM, ESAW T

ART UNIT	PAPER NUMBER
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2133

DATE MAILED: 04/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/032,859

Applicant(s)

GATHERER ET AL.

Examiner

Esaw T. Abraham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 April 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 04/11/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Response to the applicant's amendments

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 04/11/05 has been entered.

Response to the applicant's argument

The applicant argues that Wang does not teach or there is no suggestion of cascaded MAP decoding. However, the examiner disagrees and although Wang et al. do not mention the word "cascading" in the invention, the practice of cascading is deemed to be inherent to Wang et al's decoder because by virtue of the fact the process of cascading "connecting an output of a device into an input of another device, which then may be in turn be connected to another device" is commonly employed by most of decoding systems including MAP decoders for arranging data in series or in succession of stages so that each stage derives from or acts upon product of the preceding. Therefore, the absence of the phrase "cascading architecture" as in claim 1 does not make the claims allowable since cascading architecture is analogous or similar to the MAP decoding of turbo coding of the prior art. Therefore, the applied references have been applied appropriately.

The applicant further argues that Wang counts computations, not numbers of ACS units. The examiner disagrees since Wang teaches that the forward (alpha) and backward (beta) determined by series of multiplications (see expressions 17 and 18 of column 6 last paragraph and column 7 lines 1-42) and further figure 2b teaches LLR calculators (see fig. 2b, element 260)

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before they processed to extract extrinsic information that are sent to the other constituent decoder (see col. 8, lines 6-15).

In response to the applicants' argument that the references fail to show certain features of applicants' invention, it is noted that the features upon which applicant relies are not recited in the rejected claim(s) (For example, the applicant contends that the prior art does not teach "counting ACS". However, the quoted phrase is a non-claimed language). Although, the claims are interpreted in light of the specification, limitations from the specification are not read to the claims.

1. Claims 1-7 remain pending.

Information Disclosure Statement

2. The applicant's IDS of (04/11/05) have been entered. The examiner considers the IDS.

Drawings

3. Figure 2e should be designated by a legend such as **--Prior Art--** because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim objections

4. Claims 1, 4 and 6 are objected to because of the following informalities:

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Claim 1 recites, "A map decoder" in the preamble. CFR § 1.75 states that the specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention or discovery. A map decoder does **not indicate** what a subject matter the claims are directed to. The suggests that following ---A Map decoder with cascaded architecture for reducing numbers of circuits ---

Claim 4 recites, "A map decoder" in the preamble. CFR § 1.75 states that the specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention or discovery. A map decoder does **not indicate** what a subject matter the claims are directed to. The suggests that following ---A Map decoder for reducing numbers of circuits ---

Claim 6 recites, "A turbo decoder" in the preamble. CFR § 1.75 states that the specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention or discovery. A turbo decoder does **not indicate** what a subject matter the claims are directed to. The suggests that following ---A turbo decoder with cascaded architecture for performing channel coding ---

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (U.S. PN: 6,606,725).

As per claim 1, Wang et al. teach or a matrix transform circuit and a method provides for MAP decoding of turbo codes whereby the method initializing a forward recursion probability function vector and a backward recursion probability function vector (see abstract). Further, Wang et al. teach an apparatus (Map decoder or turbo decoder) for decoding a turbo-encoded symbol sequence comprising the steps of a plurality of calculators for determining a plurality of transition probability matrices for each received symbol of the sequence, the plurality of probability matrices including a matrix; a first shift register, coupled to the plurality of calculators, configured to store values of a forward recursion probability function; a second shift register, coupled to the plurality of calculators, configured to store values of a backward recursion probability function vector, the second shift register linked by a second multiplier; and means for determining (output block) a log likelihood ratio for each decoded symbol in parallel after receiving the complete symbol sequence (see claims 5-7). Wang et al. **do not explicitly** teach cascade architecture. **However**, cascade architecture is known in the art of MAP decoding or iterative decoding. **Therefore**, it would have been obvious to a person having an ordinary skill

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in the art at the time the invention was made to include a cascade architecture for arranging data in series or in a succession of stages so that each stage derives from or acts upon the product of the preceding. **This modification** would have been obvious because a person having ordinary skill in the art would have been motivated in order to achieve higher coding gains and lower decoder complexities.

As per claim 2, Wang et al. teach all the subject matter claimed in claim 1 including Wang et al. teach a plurality of calculators for determining a plurality of transition probability matrices for each received symbol of the sequence, the plurality of probability matrices including a matrix; a first shift register, coupled to the plurality of calculators (first and second ACS units), configured to store values of a forward recursion probability function vector; a second shift register, coupled to the plurality of calculators (third and fourth ACS units), configured to store values of a backward recursion probability function (see claim 5).

As per claim 3, Wang et al. teach all the subject matter claimed in claim 1 including Wang et al. in figure 2b teach, the decoder (210) include calculators (260) comprising values temporarily be put in a storage elements (M) (250) below the corresponding calculators, before they further processed to extract extrinsic information that are sent to the other constituent decoder (see col. 8, lines 6-15).

As per claims 4 and 5, Wang et al. teach the additional limitation of claim 4. The Map decoder of Wang et al. teaches table A below lists a comparison on the forward-backward recursion computations throughout successive M trellis states at arbitrary time k required by different methods (see col. 9, last paragraph and claim 2).

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6. Claims **6 and 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yagyu (U.S. PN: 6,675,342) in view of Wang et al. (U.S. PN: 6,606,725).

As per claim 6, Yagyu teach or disclose an iterative turbo decoding process utilizing comparison algorithm is implemented by dividing each iteration step into two stages wherein MAP-decoding is performed at each stage of the iteration step and the MAP-decoding produces information sequences at each stage that are then subsequently summed and quantized into binary (see col. 3, lines 27-33). Further, Yagyu in figure 1 disclose a first MAP decoder (106) receiving data and extrinsic information sequence (k), a first interleaver (112) coupled to the first MAP, a second interleaver (130) coupled to input X(k) for receiving symbols, a second MAP decoder (114) coupled to the first and second interleavers, a deinterleaver coupled to an output of said second MAP and a decision unit coupled to inputs of receiving symbols and output of first MAP decoder (see elements 118,124 and col. 6, lines 5-34). Yagyu **does not explicitly teach** that the first and second MAP decoders each include a forward and backward recursion blocks. **However**, Wang et al. teach a method of MAP decoding of turbo codes whereby the method initializing a forward recursion probability function vector and a backward recursion probability function vector (see abstract). Further, Wang et al. teach an apparatus (Map decoder or turbo decoder) for decoding a turbo-encoded symbol sequence comprising a plurality of transition probability matrices including a matrix; a first shift register, configured to store values of a forward recursion probability function; a second shift register, configured to store values of a backward recursion probability function vector, the second shift register linked by a second multiplier; and means for determining (output block) a log likelihood ratio for each decoded symbol in parallel after receiving the complete symbol sequence (see claims 5-7).

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Therefore, it would have been obvious to a person having an ordinary skill in the art at the time the invention was made to implement the teachings of Yagyu including forward recursion and backward recursion operations as taught by Wang et al. **This modification** would have been obvious because a person having ordinary skill in the art would have been motivated in order to reduce memory capacity and simplify the complicated data accesses (see col. 10, lines 20-26).

As per claim 7, Yagyu in view of Wang et al. teach all the subject matter claimed in claim 6 including Yagyu in figure 1 disclosed the output of the deinterleaver (see the interleaver coupled to the element 116) coupled to the extrinsic information of first MAP decoder (see element 106 and L extrinsic (k)).

Conclusion


7. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Esaw Abraham whose telephone number is (703) 305-7743. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are successful, the examiner's supervisor, Albert DeCady can be reached on (703) 305-9595. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.


Esaw Abraham

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GUY LAMARRE
PRIMARY EXAMINER